

Mathematics

USING SUBGRAPHS TO DETERMINE THE RECOVERABILITY OF AN ELECTRICAL NETWORK, Amanda B. Cadieu¹, J.A. Morrow^{*2}, L. Lawton^{*1}, Western Illinois University¹, Macomb, IL 61455, University of Washington², Seattle, WA 98195, ab-cadieu@wiu.edu

Electrical networks can be represented by graphs consisting of boundary nodes, interior nodes, and conductivities on the edges connecting those nodes. Such a network is considered to be recoverable when the values of the conductors are uniquely determined by and can be calculated from a corresponding response matrix. A graph is said to be recoverable if for any conductivity on the edges, that conductivity can be computed from the corresponding response matrix. We show that for circular-planar graphs and non-circular planar graphs, if any subgraph is non-recoverable then the parent graph is non-recoverable. We also investigate optimal ways to identify the smallest non-recoverable subgraph of a non-recoverable circular planar graph; such graphs are partially recoverable through parametrization. The intention is to develop ways to quickly determine the recoverability of circular and non-circular planar graphs by examining their subgraphs.

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